

What is claimed is:

1. A method for producing terephthalic acid comprising:

(A) a step of oxidizing paraxylene in a solvent mainly comprising acetic acid in the presence of a catalyst with molecular oxygen to obtain a slurry containing terephthalic acid crystals;

(B) a solid-liquid separation step of separating said slurry into crude terephthalic acid cakes and a mother liquor mainly comprising acetic acid under a pressure not less than the atmospheric pressure;

(C) a step of cleaning said crude terephthalic acid cakes with a cleaning fluid under a pressure not less than the atmospheric pressure; and

(D) a step of evaporating any liquid remaining on or in said crude terephthalic acid cakes after cleaning;

characterized in that:

said steps (B) and (C) are carried out using a single common device; and internal energy possessed by said terephthalic acid cakes or liquid remaining on or in said terephthalic acid cakes is used as at least a portion of the energy for evaporating the liquid remaining in or on said terephthalic acid cakes in said step (D).

2. A method for producing terephthalic acid comprising:

(E) a step of at least partially reducing impurities in crude terephthalic acid by bringing said crude terephthalic acid into contact with hydrogen in a solvent mainly comprising water in the presence of a catalyst;

(F) a step of crystallizing said terephthalic acid in a solvent mainly comprising water by reducing the pressure and temperature of the reaction liquid to produce a slurry containing terephthalic acid crystals;

(G) a solid-liquid separation step of separating said slurry into purified terephthalic acid cakes and a reaction mother liquor mainly comprising water under a pressure not less than the atmospheric pressure;

(H) a step of cleaning said purified terephthalic acid cakes with a cleaning fluid under a pressure not less than the atmospheric pressure; and

(I) a step of evaporating any liquid remaining in or on said purified terephthalic acid cakes;

characterized in that:

said steps (G) and (H) are carried out using a single common device; and internal energy possessed by said terephthalic acid cakes or liquid remaining on or in said terephthalic acid cakes is used as at least a portion of the energy for evaporating the liquid remaining in or on said terephthalic acid cakes in said step (I).

3. A method for producing terephthalic acid comprising:

(A) a step of oxidizing paraxylene in a solvent mainly comprising acetic acid in the presence of a catalyst with molecular oxygen to obtain a slurry containing terephthalic acid crystals;

(B) a solid-liquid separation step of separating said slurry into crude terephthalic acid cakes and a mother liquor mainly comprising acetic acid under a pressure not less than the atmospheric pressure;

(C) a step of cleaning said crude terephthalic acid cakes with a cleaning fluid under a pressure not less than the atmospheric pressure;

(D) a step of evaporating any liquid remaining on or in said crude terephthalic acid cakes after cleaning;

(E) a step of at least partially reducing impurities in crude terephthalic acid by bringing said crude terephthalic acid into contact with hydrogen in a

solvent mainly comprising water in the presence of a catalyst;

(F) a step of crystallizing said terephthalic acid in a solvent mainly comprising water by reducing the pressure and temperature of the reaction liquid to produce a slurry containing terephthalic acid crystals;

(G) a solid-liquid separation step of separating said slurry into purified terephthalic acid cakes and a reaction mother liquor mainly comprising water;

(H) a step of cleaning said purified terephthalic acid cakes with a cleaning fluid; and

(I) a step of evaporating any liquid remaining in or on said purified terephthalic acid cakes;

characterized in that:

said steps (B) and (C) are carried out using a single common device; and internal energy possessed by said terephthalic acid cakes or liquid remaining on or in said terephthalic acid cakes is used as at least a portion of the energy for evaporating the liquid remaining in or on said terephthalic acid cakes in said step (D).

4. A method for producing terephthalic acid comprising:

(A) a step of oxidizing paraxylene in a solvent mainly comprising acetic acid in the presence of a catalyst with molecular oxygen to obtain a slurry containing terephthalic acid crystals;

(B) a solid-liquid separation step of separating said slurry into crude terephthalic acid cakes and a mother liquor mainly comprising acetic acid;

(C) a step of cleaning said crude terephthalic acid cakes with a cleaning fluid;

(D) a step of evaporating any liquid remaining on or in said crude

terephthalic acid cakes after cleaning;

(E) a step of at least partially reducing impurities in crude terephthalic acid by bringing said crude terephthalic acid into contact with hydrogen in a solvent mainly comprising water in the presence of a catalyst;

(F) a step of crystallizing said terephthalic acid in a solvent mainly comprising water by reducing the pressure and temperature of the reaction liquid to produce a slurry containing terephthalic acid crystals;

(G) a solid-liquid separation step of separating said slurry into purified terephthalic acid cakes and a reaction mother liquor mainly comprising water under a pressure not less than the atmospheric pressure;

(H) a step of cleaning said purified terephthalic acid cakes with a cleaning fluid under a pressure not less than the atmospheric pressure; and

(I) a step of evaporating any liquid remaining in or on said purified terephthalic acid cakes;

characterized in that:

said steps (G) and (H) are carried out using a single common device; and internal energy possessed by said terephthalic acid cakes or liquid remaining on or in said terephthalic acid cakes is used as at least a portion of the energy for evaporating the liquid remaining in or on said terephthalic acid cakes in said step (I).

5. A method for producing terephthalic acid comprising:

(A) a step of oxidizing paraxylene in a solvent mainly comprising acetic acid in the presence of a catalyst with molecular oxygen to obtain a slurry containing terephthalic acid crystals;

(B) a solid-liquid separation step of separating said slurry into crude terephthalic acid cakes and a mother liquor mainly comprising acetic acid

under a pressure not less than the atmospheric pressure;

(C) a step of cleaning said crude terephthalic acid cakes with a cleaning fluid under a pressure not less than the atmospheric pressure;

(D) a step of evaporating any liquid remaining on or in said crude terephthalic acid cakes after cleaning;

(E) a step of at least partially reducing impurities in crude terephthalic acid by bringing said crude terephthalic acid into contact with hydrogen in a solvent mainly comprising water in the presence of a catalyst;

(F) a step of crystallizing said terephthalic acid in a solvent mainly comprising water by reducing the pressure and temperature of the reaction liquid to produce a slurry containing terephthalic acid crystals;

(G) a solid-liquid separation step of separating said slurry into purified terephthalic acid cakes and a reaction mother liquor mainly comprising water under a pressure not less than the atmospheric pressure;

(H) a step of cleaning said purified terephthalic acid cakes with a cleaning fluid under a pressure not less than the atmospheric pressure; and

(I) a step of evaporating any liquid remaining in or on said purified terephthalic acid cakes;

characterized in that:

said steps (B) and (C) are carried out using a single common device;

said steps (G) and (I) are carried out using a single common device; and

internal energy possessed by said terephthalic acid cakes or liquid remaining on or in said terephthalic acid cakes is used as at least a portion of the energy for evaporating the liquid remaining in or on said terephthalic acid cakes in said steps (D) and (I).

6. The method for producing terephthalic acid of any of claims 1, 3, 4

and 5 wherein said cleaning fluid used in said step (C) contains acetic acid.

7. The method for producing terephthalic acid of any of claims 1, 3, 4, 5 and 6 wherein at least part of vapor produced in said step (D) is recovered and recycled in a step for producing terephthalic acid as it is or after being treated.

8. The method for producing terephthalic acid of claim 7 wherein at least part of vapor produced in said step (D) is recovered and recycled in said step (A) as it is or after being treated.

9. The method for producing terephthalic acid of any of claims 1, 3, 4 and 6 to 8 wherein at least part of crystals containing terephthalic acid entrained in vapor produced in said step (D) are recovered and the crystals thus recovered are resupplied to a step for producing terephthalic acid.

10. The method for producing terephthalic acid of claim 9 wherein at least part of crystals containing terephthalic acid entrained in vapor produced in said step (D) are recovered and the crystals thus recovered are resupplied to said step (A).

11. The method for producing terephthalic acid of any of claims 2 to 10 wherein said cleaning fluid used in said step (H) mainly comprises water.

12. The method for producing terephthalic acid of any of claims 2 to 11 wherein at least part of vapor produced in said step (I) is recovered and recycled in a step for producing terephthalic acid as it is or after being

treated.

13. The method for producing terephthalic acid of claim 12 wherein at least part of vapor produced in said step (I) is recovered and recycled in said step (E) as it is or after being treated.

14. The method for producing terephthalic acid of any of claims 2 to 13 wherein at least part of crystals containing terephthalic acid entrained in vapor produced in said step (I) are recovered and the crystals thus recovered are resupplied to a step for producing terephthalic acid.

15. The method for producing terephthalic acid of claim 14 wherein at least part of crystals containing terephthalic acid entrained in vapor produced in said step (I) are recovered and the crystals thus recovered are resupplied to said step (E) and/or (F).

16. The method for producing terephthalic acid of any of claims 1 to 15 wherein said single common device or each of said single common devices is a screen bowl decanter.